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Question	AC: ASI/CGS/Cinzia Luceri	AC: BKG/Maria Mareyen	AC: DGFI/Horst Mueller
1. What general areas of study at your center rely on laser ranging data and products?	- Reference frame - Earth Orientation - Orbit determination - Gravity field - Station bias - Solution combination	Geodesy, reference frames , SLR-analysis support for observatorium Wettzell, Conception	Reference frame (ITRF processing)
2. Which targets are you currently using in your analysis work?	LAGEOS-1,-2, Etalon-1,-2, Starlette, Stella, Ajisai	LAGEOS, Etalon for ILRS products	LAGEOS-1/-2 and Etalon-1/-2
3. What are your applications for each target?			
Artificial Satellites			
Earth Orientation (EOP)	LAGEOS-1,-2, Etalon-1,-2	Yes	Yes
Reference Frame (GM, Earth center of mass)	LAGEOS-1,-2, Etalon-1,-2	Yes	Yes
Gravity Field (static and time varying)	LAGEOS-1,-2, Etalon-1,-2 Starlette, Stella, Ajisai		Yes
Tides			
Comparison/combination with other techniques	LAGEOS-1,-2, Etalon-1,-2 for solution combination with VLBI and GPS	Yes	Yes
Improved orbit development		Yes	Yes
Station position/motion	LAGEOS-1,-2, Etalon-1,-2	Yes	Yes
POD for specific mission (identify missions)	LAGEOS-1,-2, Etalon-1,-2		
O/C of stations	LAGEOS-1,-2		Yes
O/C of orbit products (based on other techniques)			
Spacecraft models			
Gravitational physics tests, relativity			
Other (explain briefly)			
Lunar Reflectors			
Lunar rotation/orientation			
Lunar composition			
Lunar Love numbers			
Excitation of librations			
Gravitational physics tests, relativity			
Precise solar system ephemerides			
Other (explain briefly)			
4. Are you receiving sufficient data volume?	Yes	No, see "New Year", weekend, last day of ILRS-daily-product (ask Erricos). Etalon often only a few observations per week	Yes
5. Are you receiving sufficient spatial and temporal data coverage?	The spatial coverage is still a problem: the North/South balance is better than in the past but the longitudinal data distribution is worse, i.e. more data in the eastern than in the western emisphere	No, global stations' distribution not sufficient (south hemisphere etc.), and see answer to 4.	Yes
6. Are the data of sufficient accuracy for your applications?	Yes	Core stations are OK. The long list of corrections edited by Horst Mueller, DGFI, gives the answer on sufficient accuracy …	Mostly
7. What other satellites do you plan to use in the future?	Low satellites for gravity field recovery	Depends on ILRS instructions (Erricos).	Ajisai, Starlette
8. What other products or data would you like to see from ILRS?	Within the AWG we are already working on: discontinuities, orbits, geocenter	An excellent SLR-IRTF (coord., vel.), updated very soon if a new station begins to work.	Atmospheric loading data, models and measured values
9. How do you access the data (CDDIS, EDC, etc)? Any problems to report?	Mainly ftp	Standard CDDIS, if this server is closed switching to EDC. No 1:1 data-filenaming (different sorting) doubles the programmer's work.	Via Internet, resp. EDC direct disk connection, minor problems
10. What other comments or suggestions do you have regarding the ILRS data and products?			The Web-interface of EDC could be better. On CDDIS pages it is sometimes not so easy to find the information required. Search utility could be helpful. Station information (log file) is often not up to date.

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Question	AC: GA/Ramesh Govind	AC: GFZ/Rolf Koenig	AC: GRGS/Florent Deleflie
1. What general areas of study at your center rely on laser ranging data and products?	As one of the Global Analysis Centre of the ILRS contributing to AWG products; TRF, EOP. Studying EOP, Geocentre and GM (Scale). Calibration DORIS determined orbits for TOPEX/Jason/Envisat.	- Precise Orbit Determination (POD) - Gravity Field - Reference frame - Relativity - Validation of space-borne GPS tracking	- Earth rotation, and its gravity field - station coordinates, range bias, terrestrial reference frame - fundamental physics - orbit determination and validation - Moon motion
2. Which targets are you currently using in your analysis work?	LAGEOS-1/-2, Etalon-1/-2Lageos-1, Lageos-2, Etalon-1, Etalon-2 Stella, Starlette GLONASS, GIOVE-A/-B TOPEX, Jason-1/-2, Envisat The SLR data for these satellites have been processed.	CHAMP, GRACE-A/-B, TerraSAR-X, GPS-35/-36, ERS-1/-2, TOPEX, LAGEOS-1/-2	- routinely (ILRS AC) : LAGEOS-1/-2, Etalon-1/-2 - other geodetic targets (gravity field and terrestrial reference frame): Starlette, Stella, Ajisai, CHAMP, GRACE - fundamental physics: Jason-2 - orbit determination and validation: Jason-1, Jason-2, GPS-35, GPS-36, GIOVE-A, GIOVE-B - the Moon !
3. What are your applications for each target?			
Artificial Satellites			
Earth Orientation (EOP)	LAGEOS-1/-2, Etalon-1/-2, GLONASS	LAGEOS-1/-2, GPS, CHAMP, GRACE	Yes
Reference Frame (GM, Earth center of mass)	LAGEOS-1/-2, Stella, Starlette	LAGEOS-1/-2, GPS, CHAMP, GRACE	Yes
Gravity Field (static and time varying)		LAGEOS-1/-2, GPS, CHAMP, GRACE	Yes
Tides		LAGEOS-1/-2, GPS, CHAMP, GRACE	Yes
Comparison/combination with other techniques	TOPEX, Jason-1/-2, Envisat, GLONASS, GIOVE-A/-B	LAGEOS-1/-2, GPS, CHAMP, GRACE	Yes
Improved orbit development		GNSS, CHAMP, GRACE	Yes
Station position/motion	LAGEOS-1/-2	LAGEOS-1/-2, ERS-1/-2, TOPEX	Yes
POD for specific mission (identify missions)		CHAMP, GRACE-A/-B, TerraSAR-X, ERS-1/-2, TOPEX, LAGEOS-1/-2	Yes (LAGEOS-1/-2, Etalon-1/-2, Starlette, Jason-2
O/C of stations	LAGEOS-1/-2		
O/C of orbit products (based on other techniques)	TOPEX, Jason-1/-2, Envisat	CHAMP, GRACE-A/-B, TerraSAR-X, GPS-35/-36	
Spacecraft models			
Gravitational physics tests, relativity		LAGEOS-1/-2	Yes: Time transfer
Other (explain briefly)			Yes: SLR for T2L2 activities
Lunar Reflectors			
Lunar rotation/orientation			Yes
Lunar composition			
Lunar Love numbers			
Excitation of librations			
Gravitational physics tests, relativity			Yes
Precise solar system ephemerides			Yes
Other (explain briefly)			
4. Are you receiving sufficient data volume?	Adequate – within reason for some spacecraft	This is a really difficult question, depending on your attitude you could answer YES or NO. Inbetween, here some answers of my colleagues: More data would be desirable in the first day(s) after manoeuvres, in November-December and during Christmas and New Year periods for ERS-2. There could always be more for CHAMP, GRACE-A, and GRACE-B. Rather yes, could be more	No for the Moon, Yes for satellites, except for T2L2, regarding the theoretical number of stations which should have a good time&frequency equipment, but cannot use it for different reasons !
5. Are you receiving sufficient spatial and temporal data coverage?	As best that can be done. Some core stations outperform others in data volume; non-core stations need some improvement in there data volume and regularity. The spatial data coverage is a major concern and limitation to the work.	As above: Sufficient, but could be more. It makes no sense to speak of spatial and temporal data coverage for CHAMP and GRACE as the data are very sporadic. More SLR stations in the southern hemisphere would be desirable.	Temporal coverage ok Lack of data above Southern hemisphere, due to the shape of the network, of course. For T2L2 : no, concerning the east part of Europe and US.
6. Are the data of sufficient accuracy for your applications?	Yes, from the core stations. Some non-core stations need improvement.	Answers of most of my colleagues was: YES. One had a distinct opinion: What is the accuracy of SLR normal points? It would be good, if finally there will be a unified scheme for calibration and accuracy assessment for all laser stations even if they come from different manufacturers. This could also help to get a clear idea of the biases and systematic errors of each SLR system. Currently it is hard to find any quality information on the ILRS website. It is hidden somewhere. As far as I know the accuracy information is based on the fits of Lageos solutions. But this does not help very muchif there is data from only a few stations available. Then, it has to be precisely clear how to treat their data.	A millimeter of accuracy, which is a next challenge of laser ranging, would provide new exciting scientific challenges. T2L2 : it depends on the time&frequency equipment available at each site and it depends also on the used format for full rate SLR (merit or CRD).
7. What other satellites do you plan to use in the future?	All the proposed LEO satellites (due for launch in the coming 5 years that will be equipped with multiple tracking systems (GPS, DORIS and retro-reflectors).	ENVISAT, CRYOSAT-2, GOCE, TanDEM-X, GALILEO, GLONASS, LARES	GOCE, Galileo constellation. LRO. COMPASS ?
8. What other products or data would you like to see from ILRS?	Nil at this time.		More scientific papers written all together, on the basis of our operational products built through the AWG for example. It is very important, from French authorities, to have more opportunities for scientists as we are, to participate to international scientific papers ; from these point of view, the AWG should be more active and should deploy actions in 2009, to have at least a special issues for SLR-LLR activities in a Journal. We are fully ready to help Erricos, Cinzia, and the others, to initiate this task, and ever ready to be in charge of this project, if everyone agrees to participate.
9. How do you access the data (CDDIS, EDC, etc)? Any problems to report?	CDDIS and EDC through ftp.	Via both, CDDIS and EDC. No major problems, the DCs are doing a great job.	Both DC for most of applications. For T2L2: Full rate SLR data comes directly from CDDIS (Merit fmt) and from EDC (CRD fmt). Except for Graz station which provided us data with local format and files just for examples.
10. What other comments or suggestions do you have regarding the ILRS data and products?		-ILRS is a good working service. Thank you! tes. -C.f. point 6. Moreover, it would be nice, if certain information is spread to the community as a whole like ceasing the distribution of IRVS. Another suggestion is to introduce fully automized reliably working SLR stations that are capable to deliver even more normal points for LEOs like CHAMP and GRACE without reducing the data for other priority missions. This could be a very useful action to be taken in order to support the economic development in the current situation of financial desaster.	Regarding SLR full rate data: it could be very usefull for T2L2 activities to have at our disposal every date of laser pulses which have been emitted by SLR stations, even if no return were detected ; in fact in this case, some pulses should have been detected on board Jason-2 by T2L2 , and so having the start dates of the corresponding stations should permit us to improve the monitoring of DORIS !... We hope that these answers will help ILRS to continue to provide scientific results based on satellite and lunar ranging !!!.

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Question	AC: JCET/Erricos Pavlis	AC: NSGF/Graham Appleby	AAC: AIUB/Daniela Thaller
1. What general areas of study at your center rely on laser ranging data and products?	Reference Frames, POD, network performance, global and regional tectonics, gravitational (static & temporally varying) modeling, altimeter calibration, fundamental physics tests, combination of techniques studies and cross-calibration, atmospheric modeling validation studies.	Reference frame realisation via contribution to daily ILRS efforts, research into local site motion	- Quicklook analysis of SLR observations to GNSS satellites (GPS, GLONASS, GIOVE): range residuals w.r.t. GNSS orbits derived at CODE IGS analysis center; the results for GPS and GLONASS are provided daily to the ILRS - orbit determination for GIOVE-A/-B - orbit determination for CHAMP and GRACE - weekly solutions of station coordinates, ERPs and orbital parameters based on Lageos data
2. Which targets are you currently using in your analysis work?	LAGEOS-1 & -2, Etalon-1 & -2, Starlette, Ajisai	LAGEOS-1/-2, Etalon-1/-2	GPS, GLONASS, GIOVE, LAGEOS CHAMP, GRACE
3. What are your applications for each target?			
Artificial Satellites			
Earth Orientation (EOP)	Yes	Yes, daily X-pole, Y-pole, LoD	Yes
Reference Frame (GM, Earth center of mass)	Yes	Earth CoM	Yes
Gravity Field (static and time varying)	Yes		
Tides	Yes		
Comparison/combination with other techniques	Yes	Comparison with GNSS and local absolute gravity	Yes
Improved orbit development	Yes	Yes	Yes
Station position/motion	Yes	Yes, for the global ILRS stations	Yes
POD for specific mission (identify missions)	Yes	Some work on Envisat, ERS-2	
O/C of stations	Yes		Yes
O/C of orbit products (based on other techniques)	Yes		Yes
Spacecraft models	Yes		
Gravitational physics tests, relativity	Yes		
Other (explain briefly)		Test of IGS GNSS orbital quality and systematic effects using laser range data	
Lunar Reflectors			
Lunar rotation/orientation			
Lunar composition			
Lunar Love numbers			
Excitation of librations			
Gravitational physics tests, relativity			
Precise solar system ephemerides			
Other (explain briefly)			
4. Are you receiving sufficient data volume?	VERY LOW for Etalon-1 & -2	Yes for LAGEOS No for Etalon	see question 5.
5. Are you receiving sufficient spatial and temporal data coverage?	In all cases we are NOT getting a complete longitudinal coverage with any combination of targets on a daily basis (as required for reliable EOP estimates)	Yes for LAGEOS No for Etalon	Especially for the high satellites (GNSS), the passes are not fully covered by SLR observations, and the gaps can be even very long. It would be nice to have a better temporal coverage for the entire satellite orbit. In addition, a parallel tracking of several stations would give some redundancy in the orbit determination. However, we are aware of the fact that there are several limitations for SLR to reach this goal (not all stations are able to track high satellites, actual global coverage of stations, huge effort in general, etc.).
6. Are the data of sufficient accuracy for your applications?	Only about a dozen stations meet the accuracy level required by most applications	Yes, mostly but with some poor quality stations	for some stations not (large biases)
7. What other satellites do you plan to use in the future?	Stella, Larets, BLITS, the Moon	All the laser-tracked GNSS vehicles	Etalon
8. What other products or data would you like to see from ILRS?	Near real-time reduction of data collected from the stations that supply hourly data	Would be interested in precise orbits of the geodetic satellites for comparison purposes.	
9. How do you access the data (CDDIS, EDC, etc)? Any problems to report?	Automatically from CDDIS and manually from EDC if CDDIS unavailable. Need to harmonize the file structure of the two to avoid manual work. If EDC does not want to physically change things, they can at least provide a "ghost" structure using links with the same naming conventions as on CDDIS, so that to an outsider their data base looks the same as CDDIS even if it is physically organized in a different manner.	Both EDC and CDDIS via automatic ftp scripts. NO problems to report	CDDIS (probably EDC in future, because of collecting the observations of one day in one file)
10. What other comments or suggestions do you have regarding the ILRS data and products?	We need a faster communication of changes at stations in order to keep the analysis products at the same quality despite those changes. Perhaps a "heads up" message to the AWG/AC/AAC lists, sufficiently earlier than the event would alert them to upcoming changes so that they can anticipate them prepared. It is usually much more difficult and not as effective if these are communicated days and sometimes months after the fact.	Clearer route on ILRS web to current data corrections would be valuable.	We are very glad that the ILRS supported our request for tracking the GNSS satellites during eclipsing period and manoevers. Unfortunately, the amount of data during the last eclipsing period (September/October 2008) was not very big due to a disadvantageous position of the satellite during the entry in the eclipsing phase and the exit out of the eclipsing phase (only a very few stations could have seen the satellite, and only at very low elevations). Nevertheless, such experiments are very interesting, so that we hope, that the ILRS will again support a similar request in future.

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Question	AAC: CSR/John Ries	Other: GSFC/Frank Lemoine	AAC: Hitotsubashi U/Toshi Otsubo
1. What general areas of study at your center rely on laser ranging data and products?	Geodesy, geodynamics, relativity, orbital dynamics, aeronomy	A. Precision Orbit Determination for Altimetry Satellites. B. Precision Orbit Determination for Gravity Field studies. C. ITRF Development. D. Intertechnique comparisons (DORIS/GPS) E. POD to the Lunar Reconnaissance Orbiter (after launch) F. Validation of atmospheric density models.	Precise orbit determination, TRF
2. Which targets are you currently using in your analysis work?	LAGEOS-1, LAGEOS-2, Starlette, Stella, Ajisai, BE-C, Etalon-1, Etalon-2, Topex/Poseidon, Jason-1, GRACE-A, GRACE-B, ICESat, GFZ-1, GP-B	TOPEX/Poseidon, Jason-1, Jason-2, Envisat, Starlette, Stella, Ajisai, LAGEOS-1/-2, GFO-1, Larets, GFZ-1, Westpac, GRACE-A/-B	Extracting highest accuracy from SLR technology
3. What are your applications for each target?			
Artificial Satellites			
Earth Orientation (EOP)	For LAGEOS-1, LAGEOS-2, Starlette, Stella, Ajisai, BE-C, Etalon-1, Etalon-2:	LAGEOS-1/-2, GFO-1, Larets, GFZ-1, Westpac, GRACE A/-B	
Reference Frame (GM, Earth center of mass)	Time variable gravity, terrestrial reference frame (station motion, Earth orientation, geocenter motion), fundamental constants such as GM of the Earth, atmospheric drag, relativity, precise orbit determination,satellite altimeter calibration, laser range quality control (bias, time-bias, precision), station position corrections (tides, loading), satellite surface force modeling (solar and terrestrial radiation pressure, thermal re-radiation effects).	LAGEOS-1/-2, GFO-1, Larets, GFZ-1, Westpac, GRACE-A/-B	
Gravity Field (static and time varying)	For GRACE-A, GRACE-B, ICESat: precise orbit validation	LAGEOS-1/-2, GFO-1, Larets, GFZ-1, Westpac, GRACE A/-B	
Tides	For Topex/Poseidon, Jason-1: precision orbit determination for ocean altimetry	LAGEOS-1/-2, GFO-1, Larets, GFZ-1, Westpac, GRACE A/-B	
Comparison/combination with other techniques	For GFZ-1, GP-B: gravity model evaluation	TOPEX/Poseidon, Jason-1, Jason-2, Envisat	
Improved orbit development	No significant work with LLR data	T/P, Jason-1, Jason-2, Starlette, Stella	Yes
Station position/motion		LAGEOS-1/-2/Starlette/Stella/Envisat	Yes
POD for specific mission (identify missions)		Altimeter missions (Jason-1, Jason-2, TOPEX, Envisat, ICESAT, LRO)	Yes (GPS, GLONASS, Etalon, LAGEOS, Ajisai, Starlette, Stella, ERS-2, Jason-1,2, Envisat, etc)
O/C of stations			Yes
O/C of orbit products (based on other techniques)		Jason-1, Jason-2, TOPEX, Envisat, GRACE-A/-B	
Spacecraft models		Envisat, GFO, Jason-1, Jason-2, TOPEX, LRO	
Gravitational physics tests, relativity			
Other (explain briefly)			
Lunar Reflectors			
Lunar rotation/orientation			
Lunar composition			
Lunar Love numbers			
Excitation of librations			
Gravitational physics tests, relativity			
Precise solar system ephemerides			
Other (explain briefly)			
4. Are you receiving sufficient data volume?	Data volume for high satellites (Etalon, GPS) is poor, and coverage of complete passes rare. Tracking of very low satellites (ICESat, GRACE) is sparse, which somewhat limits the SLR data for validating orbit accuracy. Tracking of geodetic satellites in the 800-1500 km altitude range is generally good in total volume.	More southern hemisphere data would be nice. The yield of some stations could be improved	Yes
5. Are you receiving sufficient spatial and temporal data coverage?	The spatial coverage is very poor. Much of the hemisphere containing the Pacific ocean is essentially not covered, due to poor data yield at Hawaii and Tahiti. This has implications for orbit determination (and monitoring) for ocean altimeter satellites, and for the terrestrial reference frame.	Generally yes.	Yes, but more uniform global coverage is preferable.
6. Are the data of sufficient accuracy for your applications?	Biases at the cm level remain a problem, and target/detector interaction needs to be better understood. The data is probably precise to a few mm, but the accuracy may be closer to 1 cm.	Generally yes.	Precision-wise yes, accracy-wise we don't know.
7. What other satellites do you plan to use in the future?	GNSS targets with reflector arrays, LARES.	Jason-3, H2YA, LRO, LARES, GPS	GALILEO, more low orbiters and ASTRO-G.
8. What other products or data would you like to see from ILRS?	The list of bias, time-bias, frequency bias and meteorological data problems is documented to some degre, but the implementation of corrections for the known problems to the data is extremely difficult. New users are seriously intimidated when faced with the list of issues, with no available mechanism for actually applying the corrections to the data. Even long-time users are hard-pressed to track down and apply all the known corrections, and each user implements this independently as best he/she can. Either a corrected data set, or a common code-based correction model that all users can implement is strongly suggested. Better models for the target/detector interaction, so that the center of mass correction is more accurate, is necessary to improve the precision as well as the absolute accuracy of the data. There is some research in this area, but much more work is needed. This would seem to be one of the 'tall poles' limiting the data accuracy.	N/A	No
9. How do you access the data (CDDIS, EDC, etc)? Any problems to report?	CDDIS. No significant problems to report. Data is generally posted in a timely manner. However, see Item 10.	CDDIS. No problems, - except on the rare occasions the network cuts off GSFC from the universe	No, we are greatly obliged to data centers. We would be glad if the CRD storage structure (directory/file names for daily/hourly? data etc) is announced soon.
10. What other comments or suggestions do you have regarding the ILRS data and products?	The updating of the data when a problem is discovered is somewhat ad hoc. It's not clear what the criteria are for updating the data vs leaving it alone and adopting a model. It can also take quite a while to get the data updated when a problem is found and data re-issued.		

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Question	AAC: IFE/Juergen Mueller	AAC: MCC/Vladimir Glotov	AAC: Newcastle/Philip Moore
1. What general areas of study at your center rely on laser ranging data and products?	We analyse all LLR data and generate standard and special solutions, especially related to Earth rotation and Gravitational Physics. But we also use all kinds of reference frame data and EOP series where major contributions are provided by SLR.	- Terrestrial Reference Frame and System; - Precise orbit determination (different satellites, now more important - the Global Navigation Satellites Systems GLONASS and GPS); - Models and software validation.	Gravity field studies including the temporal variation, geocentre studies
2. Which targets are you currently using in your analysis work?	All retro-reflector arrays on the Moon	LAGEOS, GLONASS, LARETS	LAGEOS-1,-2, Starlette, Stella
3. What are your applications for each target?			
Artificial Satellites			
Earth Orientation (EOP)		LAGEOS	Yes
Reference Frame (GM, Earth center of mass)		LAGEOS	Yes
Gravity Field (static and time varying)			Yes
Tides			
Comparison/combination with other techniques		GLONASS	Yes
Improved orbit development		GLONASS, LARETS	
Station position/motion		LAGEOS	Yes
POD for specific mission (identify missions)			
O/C of stations			
O/C of orbit products (based on other techniques)		GLONASS	
Spacecraft models		LAGEOS, GLONASS, LARETS	
Gravitational physics tests, relativity			
Other (explain briefly)			
Lunar Reflectors	All, with main emphasis on General Relativity. This year we will more concentrate on the lunar interior.		
Lunar rotation/orientation			
Lunar composition			
Lunar Love numbers			
Excitation of librations			
Gravitational physics tests, relativity			
Precise solar system ephemerides			
Other (explain briefly)			
4. Are you receiving sufficient data volume?	More Lunar Ranging data were very welcome, especially from more sites regulary tracking the Moon.	Insufficient volume of the data for GLONASSes (often)	Yes - but can always use more of course
5. Are you receiving sufficient spatial and temporal data coverage?	No, both spatial and temporal coverage is poor at this time.	Insufficient spatial and temporal data coverage for GLONASSes (often)	No - the laser network is too sparse for proper analysis of temporal varaiability from station displacements.
6. Are the data of sufficient accuracy for your applications?	The data quality is quite good.	Sufficient mainly	On the whole - yes
7. What other satellites do you plan to use in the future?	May be, data from lunar orbiters, if there are any. Or data from luanr transponders, beacons …	Etalon, Low satellites	Ajisai, Envisat
8. What other products or data would you like to see from ILRS?	If better predictions of the lunar reflectors were available, may be, more (SLR) sites would track the Moon.		Better tables for station corrections
9. How do you access the data (CDDIS, EDC, etc)? Any problems to report?	We use bot and have no problems.	CDDIS, EDC (no problems mainly)	CDDIS - no problems
10. What other comments or suggestions do you have regarding the ILRS data and products?	It would be helpful if the ILRS could push lunar tracking.	To continue the work as effective as possible … Very interesting will be the information concerning precise spacecrafts models for the different missions (if possible).	ILRS might consider coordinating the piggy back launch of further spherical geodetic satellites to add to Lageos, stella and starlette to permit greater decoupling between gravity field harmonics for long-term temporal variability studies.

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Question	AAC: NICT/Tadahiro Gotoh	AAC: IAA/Georgy Krasinsky	Eelco Dornboos/DUT
1. What general areas of study at your center rely on laser ranging data and products?	Studies of non-gravitational force model, especially SRP. Validation of LEO orbits solved by GPS H-L SST.	Dynamical applications of SLR and a multi-disciplinary issue of LLR.	Validation GPS-based precise orbit determination. Precise orbit determination of radar altimetry and InSAR satellites. Validation of empirical thermosphere density models. Validation of radiation pressure models.
2. Which targets are you currently using in your analysis work?	Ajisai, LAGEOS, Jason, GRACE, CHAMP, GLONASS, GPS	LAGEOS-1/-2	Ongoing missions (new data): GOCE, ERS-2, Envisat Reprocessing of older data: ERS-1, ERS-2, CHAMP, GRACE
3. What are your applications for each target?			
Artificial Satellites			
Earth Orientation (EOP)		Yes	
Reference Frame (GM, Earth center of mass)			
Gravity Field (static and time varying)		Yes	
Tides		Yes	
Comparison/combination with other techniques	Yes		GOCE, GRACE, CHAMP
Improved orbit development	Yes		ERS-1/-2, Envisat
Station position/motion			
POD for specific mission (identify missions)			ERS-1/-2, Envisat
O/C of stations			
O/C of orbit products (based on other techniques)			
Spacecraft models	Yes		Yes
Gravitational physics tests, relativity			
Other (explain briefly)			
Lunar Reflectors			
Lunar rotation/orientation			
Lunar composition			
Lunar Love numbers			
Excitation of librations			
Gravitational physics tests, relativity			
Precise solar system ephemerides			
Other (explain briefly)			
4. Are you receiving sufficient data volume?	Yes	This is no the case of LLR data. The data from the new laser station Apache have to be taken not from the same database CDDIS as all the others but from the site	A higher data volume would always be useful for our purposes.
5. Are you receiving sufficient spatial and temporal data coverage?	Yes		A higher spatial and temporal coverage would always be useful for our purposes.
6. Are the data of sufficient accuracy for your applications?	Yes	About 10 percent of SLR data are to be ignored due to poor quality	Yes
7. What other satellites do you plan to use in the future?	ASTRO-G		No firm other plans at the moment.
8. What other products or data would you like to see from ILRS?	Nothing special		None
9. How do you access the data (CDDIS, EDC, etc)? Any problems to report?	FTP from CDDIS		CDDIS and EDC. No problems to report
10. What other comments or suggestions do you have regarding the ILRS data and products?			None

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Question	Shinichi Nakamura/JAXA	Lunar AAC: Paris Obs./Gerard Francou	AAC: FFI/Per-Helge Andersen
1. What general areas of study at your center rely on laser ranging data and products?	Precise orbit determination, laser technology through SLR operation	- Earth rotation, and its gravity field - station coordinates, range bias, terrestrial reference frame - fundamental physics - orbit determination and validation - Moon motion	FFI is doing multi-technique combination of SLR, GNSS and VLBI to estimate TRF,CRF and EOP and lots of other parameters too (clocks, atmosphere etc). SLR plays a vital role here especially since it is the only non-MW technique and because it contributes very strongly to the realization of scale and determination of the physical center of mass of the Earth relative to the TRF.
2. Which targets are you currently using in your analysis work?	Ajisai, LAGEOS-1/-2, ETS-8	- routinely (ILRS AC) : LAGEOS-1/-2, Etalon-1/-2 - other geodetic targets (gravity field and terrestrial reference frame): Starlette, Stella, Ajisai, CHAMP, GRACE - fundamental physics: Jason-2 - orbit determination and validation: Jason-1, Jason-2, GPS-35, GPS-36, GIOVE-A, GIOVE-B - the Moon !	LAGEOS-1 and -2. The combined analysis will be extended with the inclusion of data from GOCE, GRACE, altimeter satellites and other satellites providing information on the gravity field. Therefore, we will start using SLR data for these satellites too within the next year, hopefully. The goal is to do TRF, CRF, EOP and gravity simultaneously, thus realizing the GGOS-strategy. Statens kartverk (the Norwegian Mapping Authority, SK) and FFI is currently establishing a group of people headed by myself (the science part) to realize this goal. The organizational part will be headed by Dr. Oddgeir Kristiansen, SK.
3. What are your applications for each target?			
Artificial Satellites			
Earth Orientation (EOP)		Yes	Yes
Reference Frame (GM, Earth center of mass)		Yes	Yes
Gravity Field (static and time varying)		Yes	Yes, especially time variation
Tides		Yes	No, not presently
Comparison/combination with other techniques		Yes	Yes
Improved orbit development		Yes	Yes
Station position/motion		Yes	Yes
POD for specific mission (identify missions)	ETS-8: clock sync experiment Ajisai, LAGIOS-1/2: making CPF	Yes (LAGEOS-1/-2, Etalon-1/-2, Starlette, Jason-2	Yes, Presently: LAGEOS In the future: GOCE, Grace, Jason?, T/P?, Champ? Any satellite with accelerometry, gravimetry, gradiometry
O/C of stations			No, downweight or skip bad data
O/C of orbit products (based on other techniques)			No
Spacecraft models			No
Gravitational physics tests, relativity		Yes: Time transfer	Yes, our software (version GEOSAT_2010) can analyze data from S/C in the Solar system. We are therefore very interested in 1-way laser data towards such S/C.
Other (explain briefly)		Yes: SLR for T2L2 activities	
Lunar Reflectors			
Lunar rotation/orientation		Yes	
Lunar composition			
Lunar Love numbers			
Excitation of librations			
Gravitational physics tests, relativity		Yes	
Precise solar system ephemerides		Yes	
Other (explain briefly)			
4. Are you receiving sufficient data volume?	Yes. I would like to express our thanks.	No for the Moon, Yes for satellites, except for T2L2, regarding the theoretical number of stations which should have a good time&frequency equipment, but cannot use it for different reasons !	The more, the better. But, I think the tracking community within ILRS are doing an outstanding job!
5. Are you receiving sufficient spatial and temporal data coverage?	Yes	Temporal coverage ok Lack of data above Southern hemisphere, due to the shape of the network, of course. For T2L2 : no, concerning the east part of Europe and US.	The more LAGEOS data, the better for me!
6. Are the data of sufficient accuracy for your applications?	Yes	A millimeter of accuracy, which is a next challenge of laser ranging, would provide new exciting scientific challenges. T2L2 : it depends on the time&frequency equipment available at each site and it depends also on the used format for full rate SLR (merit or CRD).	There is a big difference in the quality (precision, data volume) of the stations. I spend too much time in manual data editing of the SLR data. All other processing (VLBI and GNSS) are automated. Right now, I am not able to automize the editing of bad SLR data without being in risk of rejecting too much data. I have always wanted that ILRS/CDDIS should provide QL edited files where bad data and very noisy data are removed.
7. What other satellites do you plan to use in the future?	QZS: 2010 Summer Astro-G: 2011	GOCE, Galileo constellation. LRO. COMPASS ?	GOCE, GRACE Jason?, TOPEX/Poseidon?, CHAMP? Any satellite with accelerometry, gravimetry, gradiometry
8. What other products or data would you like to see from ILRS?	Cross section, Cd, and Cr of Satellite.	More scientific papers written all together, on the basis of our operational products built through the AWG for example. It is very important, from French authorities, to have more opportunities for scientists as we are, to participate to international scientific papers ; from these point of view, the AWG should be more active and should deploy actions in 2009, to have at least a special issues for SLR-LLR activities in a Journal. We are fully ready to help Erricos, Cinzia, and the others, to initiate this task, and ever ready to be in charge of this project, if everyone agrees to participate.	A) QL edited files where bad data and very noisy data are removed. B) Predicted orbits for all satellites in 7). I use such information as initial orbits in the estimation of precise orbits.
9. How do you access the data (CDDIS, EDC, etc)? Any problems to report?	Both (CDDIS and EDC), No problem, now.	Both DC for most of applications. For T2L2: Full rate SLR data comes directly from CDDIS (Merit fmt) and from EDC (CRD fmt). Except for Graz station which provided us data with local format and files just for examples.	No problems
10. What other comments or suggestions do you have regarding the ILRS data and products?	Thank you for ILRS.	Regarding SLR full rate data: it could be very usefull for T2L2 activities to have at our disposal every date of laser pulses which have been emitted by SLR stations, even if no return were detected ; in fact in this case, some pulses should have been detected on board Jason-2 by T2L2 , and so having the start dates of the corresponding stations should permit us to improve the monitoring of DORIS !... We hope that these answers will help ILRS to continue to provide scientific results based on satellite and lunar ranging !!!.	None